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Prevalence of depression among adult obese patients attending primary health care clinics in MOH, Medina, Saudi Arabia

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ABSTRACT

Background: Obesity and depression are two common conditions that adversely affect both health and the economy at the individual and social levels. Both depression and obesity lead to poor quality of life and emotional well-being, especially in social relationships. The study was carried out to investigate the prevalence of depression in obese adult patients attending MOH's primary health care clinic in Medina, Saudi Arabia in 2020. **Methodology:** A non-experimental cross-sectional analysis study of adult obese patients treated at the Ministry of Health's primary health care clinic in Almadina Almunawara, Saudi Arabia. Use a multi-part self-reported survey consisting of four main parts. It is structured based on the purpose of the research. The data were collected manually and double-entered into SPSS for analysis using appropriate statistical tests. **Results:** Of all study participants; n= 23.1% aged between 18- 35, 37.6% aged between 36- 55, 39.3% aged 56 or more. Almost two thirds (63.6%) of participants were males, 2.3% were overweight, 66.5% were Obese I, 22% obese II, and 7.5% were obese III. 34.7% of the participants think of their weight as normal and 61.8% think they are overweight. Based on PHQ; 9.2% had mild depression, 13.9% moderate, 16.2% had moderately severe, and 4.6% had severe depression. There was no significant association between severities of depression with neither any variable. **Conclusion:** Obesity leads to psychological pressure, which in turn leads to depression. People with obesity III are more likely to suffer from reactive depression, suggesting that these people will be included in future studies.

Keywords: depression, obesity, primary health care clinics, Almadina Almunawara, Saudi Arabia.

1. INTRODUCTION

Depression is defined as "mental illness which characterized by persistent low mood, lack of positive affect, and loss of interest in usually pleasurable



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activities that is different from patient's usual self and causes significant distress or impairment for ≥ 2 weeks (Gelenberg, 2010). Depression has multiple risk factors like: female gender, family history of depression, domestic abuse or violence, low socioeconomic status, low educational level, chronic disease, and disability (Otte et al., 2016). By 2020, Depression is assumed to become the second chief reason of infirmity (Murray & Lopez, 1992). According to World Health Organization (WHO), prevalence of depression is raising worldwide since it increased by 18.4% from 2005 to 2015. Prevalence of depression in Saudi Arabia is 4.5% of population (1,339,976 cases). Globally, the total number of people suffering from depression is 322 million (Al Balawi et al., 2019).

Obesity is defined as weight greater than what expected according to height due to excess fat. It measured by body mass index (BMI). For adults, WHO defines obesity as a BMI more than or equivalent to 30. Obesity will lead to increased risk for many non-communicable diseases as type 2 diabetes, some cancers, and cardiovascular diseases as hypertension, stroke, atrial fibrillation, and venous thromboembolism. It also associated with mental health disorders as depression (Lau et al., 2007). One recent study conducted in Saudi Arabia among adults visiting primary care clinics in 2019 found that prevalence of obesity is 27.6% (Al-Qahtani, 2019). Globally according to WHO; obesity prevalence tripled since 1975. Body weight perception is defined as the personal assessment of his or her weight as "underweight" or "normal weight" or "overweight" irrespective of actual body mass index. If there is discrepancy in body weight perception this is called body image distortion. Obesity and depression are two common disorders that have negative effects on both health and economy at level of individuals and society (Mathers & Loncar, 2006). Both depression and obesity lead to poor quality of life especially in social relationships, and emotional well-being (Carey et al., 2014).

According to WHO, Chronic noncommunicable diseases were estimated to account for 60% of all deaths globally in 2005 (Penninx et al., 2001). The percentage of noncommunicable diseases is rising and expected to reach up to 60% by 2020 in Eastern Mediterranean regional (WHO, 2011). Many studies have been conducted to explore the causal rapport amongst obesity and depression. One of the largest studies done in this area found that there is a statistically significance bidirectional associations between depression and obesity (Luppino et al., 2010). Some studies explain the correlation between BMI and depression by how patients perceived their weight rather than BMI. Study published in 2020 concluded that: "Being obese with self-perception of obese produced a potentiating effect, significantly increasing the likelihood of depression" (Paulitsch et al., 2021).

A cross-sectional study was done in Saudi Arabia to examine association between obesity and mental disorders among male students of King Khalid University, Abha and they found that out of 389 university students who aged between 18-26 years, obesity prevalence was 18.3% of them. Depression prevalence was 48.1%. The link amongst obesity and depression was found statistically significant ($P < 0.001$) (AlQahtani et al., 2015). Another systematic review and meta-analysis showed that significant positive associations between obesity and depression among adults obese in Middle-east countries with odds ratio of 1.27 which appeared to be more prominent among women (Abou Abbas et al., 2015). A meta-analysis done by Floriana S Luppino et al., (2010) show that obesity was rise the hazard of depression occurrences by 55% in obese, in the same time depression was increase the risk of obesity by 58%. It also shows that there is a dose-response gradient between BMI and severity of depression (Luppino et al., 2010).

A cross-sectional study done in 2019 in India, in this study, 33% of participants were obese among them 12% were reported to have hazard for moderate depression, and 54% for mild depression (Garg et al., 2019). Another cross-sectional study from Australia done in 2014 found that the relationship between weight and depression represent a U-shaped relationship because out of 3361, the prevalence of depression was 24% among underweight, 11% among normal weight, 12% among overweight, and 23% among obese (Carey et al., 2014). A cross-sectional study from China in 2018 found that overweight and abdominal obesity leading to higher risk of depression (Carey et al., 2018). In other hand, cross-sectional study done on Mexican population show being obese female had 1.28 increased risks to develop depression in comparison to normal weight women. The study found no association for men, and no associations amongst abdominal fatness and depression with any gender variation (Zavala et al., 2018).

A meta-analysis published in Journal of the American collage of Nutrition showed that obese people are 32% more likely to have depression. Also frequency of depression was greater in females (Pereira-Miranda et al., 2017). Other aspect that has been examined in this area is to investigative whether weight perception leads to depression or not. A cross-sectional study published in 2020, weight insight arbitrated the link of depression and obesity in 39.3% of individual. It concludes with this result self-perception of being fat meaningfully rise the probability of depression" (Paulitsch et al., 2021). A cross-sectional study on Norwegian population published in 2019 that investigate weight underestimation and its link to anxiety and depression.

The study found that out of 3266 adults with overweight/obesity, 1384 (42%) of them underestimated their weight (Kvaløy et al., 2019). Other study conducted in Korea concludes that "BMI was significantly associated with depressed mood. Women with distorted body image, either underestimation or overestimation tend to be had a greater risk for depressed mood" (Kim et al., 2008).

Study objectives

To determine the prevalence of depression among obese adult patients attending primary health care clinics in MOH, Medina, Saudi Arabia during 2020, to find out if there is a statically significance association between obesity and depression, to explore sociodemographic factors that increase depression prevalence in this target group, and to find out whether weight perception mediated the association between depression and obesity or not.

2. METHODOLOGY**Study design**

A non-experimental analytic cross-sectional study

Study area

Al Madinah Al Munawarah is located at Eastern Part of Al Hijaz Region, KSA. It lies only 250 km (155 miles) away from Red sea.

Study population

Adult obese attending primary healthcare clinics in Ministry of Health, Al Madinah AlMunawarah, Saudi Arabia during 2020

Study period

From 1st January to 31st December 2020

Inclusion criteria

Obese (BMI ≥ 30); Adult (≥ 18 years old); Female and male; Attend primary health care clinic; Ability to communicate

Exclusion criteria

Disappointment to whole the survey for any explanations

Sample size

The author calculates sample size from recent study result of obesity prevalence among adults in Saudi Arabia in 2019 by this equation:

Sample size $n = Z^2(1-\alpha) p(1-p)/d^2$

$Z^2(1-\alpha)$ = level of confidence (for a level of confidence of 95%, $z = 1.96$) p = sample proportion ($p = 0.3$)

d^2 = tolerated margin of error (0.05)

So, the target sample size for this study is to include 323 participants.

Response rate was calculated.

Sampling techniques

The author was use stratified sampling method in this study:

Stage 1: by stratifying Medina into 4 regions (North, East, South, West) and know the name of all PHCs in each region

Stage 2: Choose one PHC from each region by simple random sample method

Stage 3: Choose participants was be randomly by systemic sampling method (Every 2nd obese attending the 4 selected PHC was enrolled in the study)

The number of participants enrolled in the study was being the same as possible from each center.

Study tool

This study uses a multiparts self-reported questionnaire which consists of 4 majorparts based on the study objectives:

-Sociodemographic characteristics including: age, gender, occupation, level of education, and other chronic comorbidities.

-BMI calculation: by taking participants' weight in kilograms and height in centimeter. Then BMI was being calculated and WHO criteria applied. Underweight (<18.5 kg/m²), normal weight (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), and obese (>30 kg/m²).

-Body weight perception: was be evaluated from the answer to one question, "How do you feel today regarding your weight?", the answer was be categorized into 3 groups: underweight, normal-weight, overweight.

-Depression assessment: by the Patient Health Questionnaire (PHQ-9). The PHQ-9 is a valid 9-question instrument used to screen

for the presence and severity of depression according to DSM-5. It takes 2 to 5 minutes to complete it, and has demonstrated as 61% sensitivity and as 94% specificity in adult [30].

This brief tool has been widely used in the primary health care clinics. The PHQ-9 evaluates the following areas: loss of interest and pleasure in doing things, feeling depressed or hopeless, difficulty with sleeping (either sleeping too much, falling asleep, or staying asleep), feeling fatigue or lacking energy, overeating or loss of appetite, feeling like a failure or that you have disappointed your family or yourself, difficulty concentrating such as when you're watching television or reading the news, moving or speaking so slowly or the opposite speaking so quickly and being fidgety and thinking about death or wishing to harm yourself somehow. For each statement, the person is asked how often they have experienced that issue in the last two weeks. It is scored on a 27-point scale. A total score of <4 classified as no depression, 5-9 classified as mild depression, 10-14 classified as moderate depression, 15-19 classified as moderately severe, and ≥ 20 classified as severe depression.

Data entry and analysis

Data was collected by hand and was entered in SPSS by double entry method to analyze it using appropriate statistical tests. To say the results are statistically significant P-value must be <0.05 .

Pilot study

To test for applicability and feasibility of this questionnaire, time taking to finish one questionnaire, and the process of conducting this study.

Ethical considerations

The study is self-funded. No reported conflict of interests. The questionnaire was include a letter guarantee the confidentiality and anonymity of participants and letter clearly indicates that participation was be voluntary and without any direct or indirect effect, in addition participants have the right to dismiss their participation. Only the information required for this study was being collected and they were used for the purpose of this study. Also, the questionnaire involves contact information for author to allow participants to ask any question related to the study. The proposal was submitted to research ethics committee of the general directorate of the health affairs of Al Madinah to get approval. The approval letter was obtained with number (IBR 175-2021).

3. RESULTS

In table (1); of all study participants; $n=40$ (23.1%) aged between 18- 35, $n=65$ (37.6%) aged between 36- 55, and $n=68$ (39.3%) aged 56 or more. Almost two thirds of participants were males $n=110$ (63.6%). (89%) were Saudi. Most participants were married $n=123$ (71.1%). (26%) of participants have secondary school certificate and (46.8%) had university certificate. Of all sample, $n=87$ (50.3%) had chronic disease. Regarding BMI, (2.3%) were overweight, (66.5%) were Obese I, (22%) obese II, and (7.5%) were obese III. (34.7%) of all sample think of their weight as normal and (61.8%) think they are overweight. According to Table 2 and figure 1; PHQ Depression severity shows Mean \pm SD score of 6.4 ± 7.2 . $n=16$ (9.2%) had mild depression, 24 (13.9%) moderate, 28 (16.2%) had moderately severe, and 8 (4.6%) had severe depression. In table 3 and 4; there was no substantial link between severity of depression or PHQ Depression score with neither any variable of sociodemographic variables (P Value less than 0.05) except self-reflect on body image with PHQ Depression score ($P=0.016$).

Table 1 Sociodemographic characters of participants ($n=173$).

| Parameter | | No. (%) |
|----------------|---------------|-----------------|
| Age (in years) | 18 - | 40 (23.1%) |
| | 36 - | 65 (37.6%) |
| | 56 + | 68 (39.3%) |
| | Mean \pm SD | 49.4 \pm 15.7 |
| Sex | Female | 63 (36.4%) |
| | Male | 110 (63.6%) |
| Nationality | Saudi | 154 (89%) |
| | Non-Saudi | 19 (11%) |
| Marital status | Single | 21 (12.1%) |
| | Married | 123 (71.1%) |

| | | |
|---------------------|-----------------|----------------|
| | Widowed | 9 (5.2%) |
| | Divorced | 20 (11.6%) |
| Educational level | Illiterate | 11 (6.4%) |
| | Primary | 8 (4.6%) |
| | Intermediate | 18 (10.4%) |
| | Secondary | 45 (26%) |
| | University | 81 (46.8%) |
| | Post Graduate | 10 (5.8%) |
| Occupational status | Unoccupied | 78 (45.1%) |
| | Occupied | 95 (54.9%) |
| Chronic diseases | No | 86 (49.7%) |
| | Yes | 87 (50.3%) |
| BMI | Average | 3 (1.7%) |
| | Overweight | 4 (2.3%) |
| | Obesity grade I | 115 (66.5%) |
| | Obese grade II | 38 (22%) |
| | Obese grade III | 13 (7.5%) |
| | Mean \pm SD | 33.9 \pm 5.0 |
| Self-reflect | Overweight | 107 (61.8%) |
| | Underweight | 6 (3.5%) |
| | Normal | 60 (34.7%) |

Table 2 PHQ Depression severity and mean score among participants (n= 173).

| Parameter | | No. (%) |
|-------------------------|-------------------|---------------|
| PHQ Depression severity | Minimal | 97 (56.1%) |
| | Mild | 16 (9.2%) |
| | Moderate | 24 (13.9%) |
| | Moderately severe | 28 (16.2%) |
| | Severe | 8 (4.6%) |
| PHQ Score | Mean \pm SD | 6.4 \pm 7.2 |

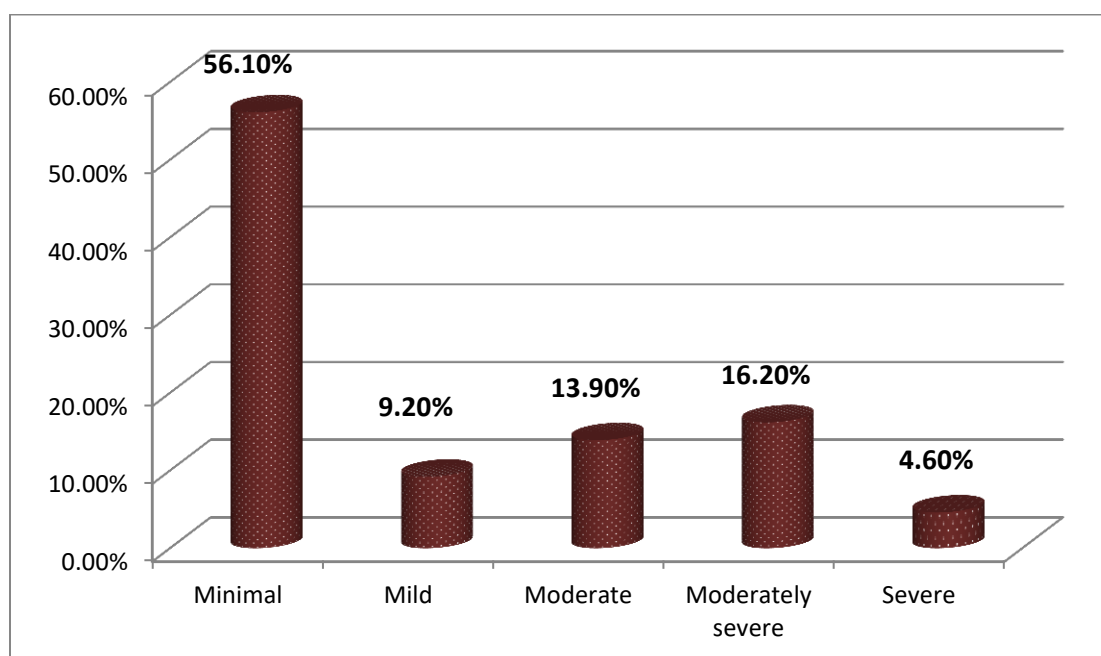


Figure 1 PHQ Depression severity among participants (n= 173)

Table 3 Association between sociodemographic variables with severity of depression

| Parameter | | Minimal | Mild | Moderate | Moderately severe | Severe | P-value |
|----------------------------|-----------------|------------|------------|------------|-------------------|-----------|---------|
| Age, y | 18 - | 20 (50%) | 5 (12.5%) | 8 (20%) | 4 (10%) | 3 (7.5%) | 0.399 |
| | 36 - | 37 (56.9%) | 8 (12.3%) | 8 (12.3%) | 9 (13.8%) | 3 (4.6%) | |
| | 56+ | 40 (58.8%) | 3 (4.4%) | 8 (11.8%) | 15 (22.1%) | 2 (2.9%) | |
| Sex | Female | 34 (54%) | 5 (7.9%) | 12 (19%) | 8 (12.7%) | 4 (6.3%) | 0.469 |
| | Male | 63 (57.3%) | 11 (10%) | 12 (10.9%) | 20 (18.2%) | 4 (3.6%) | |
| Nationality | Saudi | 87 (56.5%) | 13 (8.4%) | 21 (13.6%) | 26 (16.9%) | 7 (4.5%) | 0.821 |
| | Non-Saudi | 10 (52.6%) | 3 (15.8%) | 3 (15.8%) | 2 (10.5%) | 1 (5.3%) | |
| Marital status | Single | 11 (52.4%) | 2 (9.5%) | 5 (23.8%) | 2 (9.5%) | 1 (4.8%) | 0.618 |
| | Married | 71 (57.7%) | 9 (7.3%) | 16 (13%) | 20 (16.3%) | 7 (5.7%) | |
| | Widowed | 5 (55.6%) | 1 (11.1%) | 0 (0%) | 3 (33.3%) | 0 (0%) | |
| | Divorced | 10 (50%) | 4 (20%) | 3 (15%) | 3 (15%) | 0 (0%) | |
| Educational level | Illiterate | 8 (72.7%) | 1 (9.1%) | 2 (18.2%) | 0 (0%) | 0 (0%) | 0.929 |
| | Primary | 5 (62.5%) | 1 (12.5%) | 1 (12.5%) | 0 (0%) | 1 (12.5%) | |
| | Intermediate | 12 (66.7%) | 1 (5.6%) | 2 (11.1%) | 3 (16.7%) | 0 (0%) | |
| | Secondary | 25 (55.6%) | 5 (11.1%) | 6 (13.3%) | 8 (17.8%) | 1 (2.2%) | |
| | University | 42 (51.9%) | 8 (9.9%) | 12 (14.8%) | 14 (17.3%) | 5 (6.2%) | |
| | Post Graduate | 5 (50%) | 0 (0%) | 1 (10%) | 3 (30%) | 1 (10%) | |
| Occupational status | Unoccupied | 42 (53.8%) | 10 (12.8%) | 10 (12.8%) | 13 (16.7%) | 3 (3.8%) | 0.662 |
| | Occupied | 55 (57.9%) | 6 (6.3%) | 14 (14.7%) | 15 (15.8%) | 5 (5.3%) | |
| Chronic diseases | No | 50 (58.1%) | 5 (5.8%) | 11 (12.8%) | 14 (16.3%) | 6 (7%) | 0.342 |
| | Yes | 47 (54%) | 11 (12.6%) | 13 (14.9%) | 14 (16.1%) | 2 (2.3%) | |
| BMI | Average | 1 (33.3%) | 1 (33.3%) | 1 (33.3%) | 0 (0%) | 0 (0%) | 0.554 |
| | Overweight | 3 (75%) | 0 (0%) | 0 (0%) | 1 (25%) | 0 (0%) | |
| | Obesity grade I | 64 (55.7%) | 13 (11.3%) | 16 (13.9%) | 15 (13%) | 7 (6.1%) | |
| | Obese grade II | 23 (60.5%) | 1 (2.6%) | 6 (15.8%) | 7 (18.4%) | 1 (2.6%) | |
| | Obese grade III | 6 (46.2%) | 1 (7.7%) | 1 (7.7%) | 5 (38.5%) | 0 (0%) | |
| Self-reflect on body image | Overweight | 53 (49.5%) | 12 (11.2%) | 16 (15%) | 22 (20.6%) | 4 (3.7%) | 0.352 |
| | Underweight | 5 (83.3%) | 0 (0%) | 1 (16.7%) | 0 (0%) | 0 (0%) | |
| | Normal | 39 (65%) | 4 (6.7%) | 7 (11.7%) | 6 (10%) | 4 (6.7%) | |

Table 4 Association between PHQ score and sociodemographic data of participants

| Parameter | | PHQ Score | P-value |
|----------------|-----------|-----------|---------|
| Age (in years) | 18 - | 6.8 ± 7.5 | 0.847 |
| | 36 - | 6.1 ± 7.2 | |
| | 56+ | 6.5 ± 7.3 | |
| Sex | Female | 6.6 ± 7.5 | 0.622 |
| | Male | 6.3 ± 7.2 | |
| Nationality | Saudi | 6.5 ± 7.3 | 0.882 |
| | Non-Saudi | 6.2 ± 6.8 | |
| Marital status | Single | 6.1 ± 7 | 0.970 |
| | Married | 6.5 ± 7.5 | |
| | Widowed | 7.2 ± 7.8 | |

| | | | |
|----------------------------|-----------------|-----------|-------|
| | Divorced | 5.9 ± 6.2 | |
| Educational level | Illiterate | 3.6 ± 4.1 | 0.842 |
| | Primary | 5.8 ± 7.8 | |
| | Intermediate | 4.9 ± 6.9 | |
| | Secondary | 6.4 ± 7 | |
| | University | 6.9 ± 7.5 | |
| | Post Graduate | 8.5 ± 9 | |
| Occupational status | Unoccupied | 6.4 ± 6.9 | 0.861 |
| | Occupied | 6.4 ± 7.6 | |
| Chronic diseases | No | 6.6 ± 7.8 | 0.867 |
| | Yes | 6.3 ± 6.7 | |
| BMI | Average | 8 ± 3.7 | 0.462 |
| | Overweight | 5.8 ± 9.1 | |
| | Obesity grade I | 6.3 ± 7.3 | |
| | Obese grade II | 6 ± 7.2 | |
| | Obese grade III | 8.5 ± 7.8 | |
| Self-reflect on body image | Overweight | 7.2 ± 7.1 | 0.016 |
| | Underweight | 2.5 ± 4.7 | |
| | Normal | 5.4 ± 7.5 | |

4. DISCUSSION

Depression and obesity are stress disorders that have a strong relationship with each other. When depression and obesity coexist, those negatively affect health and social relations (Carey et al., 2018). In this study, we included a total of 173 individuals contributed in the study. The majority of participants was males (63.6%) and married (71.1%). The mean age of our participants was 49.4 ± 15.7 . In this randomly taken sample among the general population of El-madinah El-monawarah we estimated a mean PHQ Score of depression to be 6.4 ± 7.2 . Generally, depression level was minimum in 97 (56.1%), mild in 16 (9.2%), moderate in 24 (13.9%) and severe in 8 (4.6%). This level of severity of depression indicates a low prevalence of depression among our randomly selected sample. This result is similar to the results found by Almarhoon et al., (2021) in their study, as they also reported a minimum to mild depression severity level to be 65.2%. This level is highly higher than what was reported in China by Xinghu Zhou et al., (2014), who reported the prevalence of depressive symptoms to be 5.9%, which is almost similar to depression level estimated in Tanzania (Moledina et al., 2018).

In the current study, most of our participants (66.5%) were obese grade 1, (22%) of them were obese grade 2 and (7.5%) were obese grade 3. Reporting the self-reflection, 61.8% of the participants were overweighting. Many previous studies were done to look at the correlation between obesity and depression due to their significant morbidity and mortality rate worldwide. While the study of Boutelle et al., (2010), demonstrated that obesity is a risk influence for only depressive symptoms, whoever, the symptoms can lead to clinical depression. There was previously reported a complex connotation in obesity and depression with many various factors such as severity of depression, severity of obesity, gender, socioeconomic status (SES), gene-by-environment interactions, childhood experiences (Faith et al., 2002). This is unlike the results of many other previous study who reported that the majority of cases of depression were reported among underweight and obese individuals (43.4% and 41.7%), respectively (Almarhoon et al., 2021).

Our study found that 21.6% of obese people had mild depressive symptoms and 8.7% with severe symptoms. These results are much lower than those of Almarhoon et al., (2021) found that 23.5% of obese people had mild and 31.6% with moderate to severe symptoms. Similar study Indian research article reported similar results with them. They recommend lifestyle changes as primary interventions for obese individuals at low risk of depression (Carey et al., 2014). In another study involving a sample of middle-aged women, we observed a strong and consistent relationship. The rate of depression in women with a BMI of 30 and/or higher was more than double that of women with a BMI below 30. It was also previously estimated that there is a positive association between depression, obesity and age (Simon et al., 2008).

Our study showed no relation between age and depression with ($P = 0.339$) which is unlike another study found a significant relation especially in among 18-25 year olds (Almarhoon et al., 2021). Our study didn't find a relation between sex and depression. However, some studies also show that the relationship between girls and women is stronger than that of boys and men.

Furthermore, work stress was also an important cause of psychological stress in the individuals and depression, our study found no relation between occupational status and depression (Stunkard et al., 2003; Erickson et al., 2000; Carpenter et al., 2000).

In our study, the self-reflect in body image had a significant relation with the PHQ score, with ($P=0.016$). This may be because the psychosocial factors especially in physical appearance is of chief importance for uniqueness, a sense of dominance and attractiveness. Arrogances to clothing, especially among women, can also play a significant role in depression relation with self-reflecting body image; however Attitude toward clothing can be more important and stressful in those countries where obese patients enjoy free clothing that may be judged negatively regarding their appearance (Stunkard et al., 2003; Carpenter et al., 2000).

5. CONCLUSION

Obesity causes psychological pressure and, as a result, depression. People with obesity III are more likely to suffer from reactive depression, suggesting that these people will be included in future studies. We also recommend psychological support counseling for obese individuals who have risk for depression.

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Informed consent

Informed consent was obtained from all participants included in the study.

Author Contributions

All the authors contributed evenly with regards to data collecting, analysis, drafting and proofreading the final draft.

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This study has not received any external funding.

Conflict of Interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are presented in the paper.

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